

## **Residential Water Conservation**

There are two principal strategies for *passively* reducing residential water use: fixing leaks and installing water conserving fixtures. Fixing leaks is often easy and inexpensive and can result in some remarkable and unexpected water savings. Replacing fixtures is normally more costly and more time consuming. In many cases the water savings can offset or in some cases more than offset the cost of installing the fixture. If your home is served by a well that is only producing marginal quantities of water, low flow fixtures may make the difference between needing replacement well and being able to live comfortably with your existing well.

Here are some practical water conservation practices that may be of help to you.

### **Toilet Leak Detection**

Leaking toilets waste more water than any other fixture in the home. Even a silent toilet leak (that's one you normally can't hear) will waste from 30 to 500 gallons of water per day! The ones you can hear will waste much, much more. Such wastage can normally be attributed to a faulty water level adjustment or to a leaky flapper.

#### **Leaky flappers and the "dye test"**

Most people will say their toilet does not leak. There is one sure way to find out. Put some food dye in the tank and then leave for 15 minutes. When you return, look into your bowl to see if there is now dye color in the water spot. If there is color, or if you already can hear and or see water running in your bowl, it's time for a new flapper!

Source: [www.h2ouse.org](http://www.h2ouse.org)

### **Faucet Leaks**

Most faucet leaks are plainly visible as drips coming out of the faucet aerator. Occasionally faucets may leak in other places such as the on/off handle or in the pipes below the basin. If you are unsure if your faucet is leaking you might try using your water meter to detect the leak.

Leaks should be fixed immediately since they can quickly develop into a serious break. Temporary repairs are only temporary, and wrapping the pipe usually fails. If you find a fixture that is leaking, turn off the shutoff valve for that device. Then locate the leak. Try to tighten any fittings that leak. A quarter or half turn with a wrench might do the trick. Be careful not to over-tighten fittings. Another possible cause is that the pipes are undersized and the water velocity is too high.

### **Estimated faucet leakage rates**

#### **Drips**

60 drops per minute = 192 gallons per month

90 drops per minute = 310 gallons per month

120 drops per minute = 429 gallons per month

#### **Stream**

3" stream = 1,095 gallons per month

6" stream = 2,190 gallons per month

9" stream = 3,290 gallons per month

Source: [www.h2ouse.org](http://www.h2ouse.org)

## Plumbing

Individual residential water users can conserve water by using low-flow plumbing fixtures. These are one-time conservation measures that can be implemented automatically with little or no additional cost over their life times and in some cases, they can even save the resident money over the long term. In one example, it was estimated that an average three-member household could reduce its water use by 54,000 gallons annually.

**Low-Flush Toilets.** Residential demands account for about three-fourths of the total urban water demand. Indoor use accounts for roughly 60 percent of all residential use, and of this, toilets (at 3.5 gallons per flush) use nearly 40 percent. Toilets, showers, and faucets combined represent two-thirds of all indoor water use. More than 4.8 billion gallons of water is flushed down toilets each day in the United States. The average American uses about 9,000 gallons of water to flush 230 gallons of waste down the toilet per year (Jensen, 1991). In new construction and building rehabilitation or remodeling there is a great potential to reduce water consumption by installing low-flush toilets.

Conventional toilets use 3.5 to 5 gallons or more of water per flush, but low-flush toilets use only 1.6 gallons of water or less. Since low-flush toilets use less water, they also reduce the volume of wastewater produced, which can actually enhance the operation of conventional onsite sewage systems by increasing retention time in treatment devices.

Effective January 1, 1994, the Energy Policy Act of 1992 (Public Law 102-486) requires that all new toilets produced for home use must operate on 1.6 gallons per flush or less. Toilets that operate on 3.5 gallons per flush will continue to be manufactured, but their use will be allowed for only certain commercial applications through January 1, 1997 (NAPHCC, 1992).

Even in existing residences, replacement of conventional toilets with low-flush toilets is a practical and economical alternative. The effectiveness of low-flush toilets has been demonstrated in a study in the City of San Pablo, California. In a 30-year-old apartment building, conventional toilets that used about 4.5 gallons per flush were replaced with low-flush toilets that use approximately 1.6 gallons per flush. The change resulted in a decrease in water consumption from approximately 225 gallons per day per average household of 3 persons to 148 gallons per day per household a savings of 34 percent! Although the total cost for replacement of the conventional toilets with low-flush toilets was about \$250 per unit (including installation), the water conservation fixtures saved an average of \$46 per year from each unit's water bill. Therefore, the cost for the replacement of the conventional toilet with a low-flush toilet could be recovered in 5.4 years.

**Toilet Displacement Devices.** Plastic containers (such as plastic milk jugs) can be filled with water or pebbles and placed in a toilet tank to reduce the amount of water used per flush. By placing one to three such containers in the tank (making sure that they do not interfere with the flushing mechanisms or the flow of water), more than 1 gallon of water can be saved per flush. A toilet dam, which holds back a reservoir of water when the toilet is flushed, can also be used instead of a plastic container to save water. Toilet dams result in a savings of 1 to 2 gallons of water per flush.

**Low-Flow Showerheads.** Showers account for about 20 percent of total indoor water use. By replacing standard 4.5-gallon-per-minute showerheads with 2.5-gallon-per-minute heads, which cost less than \$5 each, a family of four can save approximately 20,000 gallons of water per year. Although individual preferences determine optimal shower flow rates, properly designed low-flow showerheads are available to provide the quality of service found in higher-volume models.

Whitcomb (1990) developed a model to estimate water use savings resulting from the installation of low-flow showerheads in residential housing. Detailed data from 308 single-family residences involved in a pilot program in Seattle, Washington, were analyzed. The estimated indoor water use per person dropped 6.4 percent after low-flow showerheads were installed (Whitcomb, 1990).

**Faucet Aerators.** Faucet aerators, which break the flowing water into fine droplets and entrain air while maintaining wetting effectiveness, are inexpensive devices that can be installed in sinks to reduce water use. Aerators can be easily installed and can reduce the water use at a faucet by as much as 60 percent while still maintaining a strong flow. More efficient kitchen and bathroom faucets that use only 2 gallons of water per minute--unlike standard faucets, which use 3 to 5 gallons per minute--are also available.

**Pressure Reduction.** Because flow rate is related to pressure, the maximum water flow from a fixture operating on a fixed setting can be reduced if the water pressure is reduced. For example, a reduction in pressure from 100 pounds per square inch to 50 psi at an outlet can result in a water flow reduction of about one-third.

Homeowners can reduce the water pressure in a home by installing pressure-reducing valves. The use of such valves might be one way to decrease water consumption in homes that are served by municipal water systems. For homes served by wells, reducing the system pressure can save both water and energy. Many water use fixtures in a home, however, such as washing machines and toilets, operate on a controlled amount of water, so a reduction in water pressure would have little effect on water use at those locations.

A reduction in water pressure can save water in other ways: it can reduce the likelihood of leaking water pipes, leaking water heaters, and dripping faucets. It can also help reduce dishwasher and washing machine noise and breakdowns in a plumbing system.

A study in Denver, Colorado, illustrates the effect of water pressure on water savings. Water use in homes was compared among different water pressure zones throughout the city. Elevation of a home with respect to the elevation of a pumping station and the proximity of the home to the pumping station determine the pressure of water delivered to each home. Homes with high water pressure were compared to homes with low water pressure. An annual water savings of about 6 percent was shown for homes that received water service at lower pressures when compared to homes that received water services at higher pressures.

Source: USEPA Web Site (<http://www.epa.gov/water/you/chap3.html>)